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10/025,671	12/26/2001	Douglas N. Curry	101256.01	8406

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EXAMINER
DO, ANH HONG

ART UNIT	PAPER NUMBER
2624	

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20

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/025,671	CURRY, DOUGLAS N.	
	Examiner	Art Unit	
	ANH H DO	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 July 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *7 and 10-12* is/are allowed.

6)☒ Claim(s) *1-6,8,9 and 13-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *21* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 7/8/2003 have been fully considered but they are not persuasive.

With respect to the applicant's argument that cited prior art, either individually or in combination, does not teach or suggest discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge. In contrast, Hsu clearly teaches an erosion operation for removing pixels from an edge (col. 5, lines 23-25) and Hyatt also discloses removing pixels 972, 983, ... along a horizontal direction parallel to an edge while selecting pixels along the vertical direction perpendicular to the edge (see Fig. 9J, and col. 206, lines 4-9 and lines 21-34). Thus, the cited prior art in combination does teach the subject matter recited in claims 1-6, 8, 9, and 13-18.

For the foregoing reason, it is believed the rejection should be sustained.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-6, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Honma et al. (U.S. Patent No. 5,774,634) in view of Hsu et al. (U.S. Patent No. 6,389,176 B1) and Hyatt (U.S. Patent No. 5,487,172).

Regarding claim 1, Honma discloses:

- decompressing data from the compressed data bitword to provide data indicative of the plurality of explicit pixels (Fig. 4: decompressing data by decode ckt 12);

- synthesizing data from the compressed data bitword to provide data corresponding to a synthesized pixel (Fig. 4: synthesizing data by image synthesis unit 6).

One skilled in the art would have clearly recognized that the method of Honma is capable of reproducing high quality image (col. 3, lines 60-62). Honma does not specifically teach discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge, and the at least one synthesized pixel representing at least one discarded pixel.

Hsu, in the same field of endeavor, discloses:

- discarding pixels along a direction parallel to an edge (col. 5, lines 23-25, teaches an erosion operation for removing pixels from the edge), and the at least one synthesized pixel representing at least one discarded pixel (col. 5, lines 51-59, teaches the synthesis process the synthesized pixel implicitly represents the discarded pixel in the odd samples), wherein the synthesis operation is to enhance edge information and reconstruct a high-quality image (col. 3, lines 11-16).

And Hyatt teaches removing pixels 972, 983, ... along a horizontal direction parallel to the edge while selecting pixels along the vertical direction perpendicular to the edge (see Fig. 9J, and col. 206, lines 4-9 and lines 21-34), wherein the Hyatt's device is to improve the edges smoothing (col. 11, lines 32-33) so as to implicitly render high quality images.

Therefore, it would have been obvious for Honma to discard pixels along a direction parallel to an edge and maintain those along a direction perpendicular to the edge, and to represent the synthesized pixel by the discarded pixel as taught by Hsu and Hyatt in order to reproduce high quality images.

Regarding claim 2, although Honma, Hsu and Hyatt do not specifically teach that decompressing a quantity of non-continuous tone data is increased to approximately 4 times of a quantity of uncompressed non-continuous tone data present in a plurality of bitwords representing a plurality of pixels, such a limitation is merely a matter of design choice and would have been obvious in the method of Honma, Hsu and Hyatt. Honma teaches that in compression the quantity of data is reduced (or compressed) (col. 14, lines 27-29), and it will be expanded in the decompression step since the expansion circuit performs the reverse operation to that performed by the compression circuit (col. 13, lines 4-6); in other words, the data is increased in decompression step. The limitation in claim 2 does not define a patentably distinct invention over that in Honma since both the invention as a whole and Honma, Hsu and Hyatt are directed to increasing data. The magnitude in which the data is increased is inconsequential for the invention as a whole and presents no new or unexpected results, so long as the data is

successfully increased. Therefore, to have the data quantity in decompression to be increased approximately 4 times of that of the uncompressed data would have been obvious design choice to one of ordinary skill in the art.

Regarding claim 3, Honma discloses decompressing the non-continuous data with high resolution in one dimension into a high resolution bitmap (Fig. 4: bitmap development unit 3, decode ckt 12 and image synthesis unit 6).

Regarding claim 4, Honma teaches:

- identifying a bit word as continuous tone data (Fig. 4: discrimination ckt 2);

- decompressing continuous tone data to provide image data for a single pixel at a highest spatial resolution corresponding to a plurality of pixels (Fig. 4: decode ckt 12 and col. 1, lines 44-63).

Regarding claim 5, Hsu teaches bitwords of information corresponding to discarded non-continuous tone data are synthesized (col., lines 51-59, teaches the synthesis process the synthesized pixel implicitly represents the discarded pixel in the odd samples).

Regarding claim 6, Honma discloses each of bitwords are bytes (col. 24, lines 21-23).

Regarding claim 8, Honma teaches synthesizing the data is performed in either a fastscan direction or a slowscan direction based on a direction bit contained that bitword (Fig. 13: main-scan direction or sub-scan direction).

Regarding claim 9, Honma discloses determining which pixel positions are to be synthesized during decompression based on the direction bit (col. 20, lines 10-13).

4. Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Honma et al. (U.S. Patent No. 5,774,634) in view of the prior art described in the application (PAA) and Hyatt (U.S. Patent No. 5,487,172).

Regarding claim 15, Honma discloses:

- a decompressor that decompresses a data bitword map to provide high spatial resolution data containing non-continuous tone data, and that decompresses the data bitword map to provide low spatial resolution continuous tone data (Fig. 4: decode ckt 12 and col. 1, lines 44-63).

One skilled in the art would have clearly recognized that the decoder in Honma is to reproduce high quality image (col. 3, lines 60-62). Honma does not specifically teach using extra resolution in a direction perpendicular to an edge of marks to provide the high resolution data containing non-continuous tone data, and discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge.

The PAA, in the same filed of endeavor, teaches providing high spatial resolution data containing non-continuous tone data using extra resolution across edges of marks (specification, page 1, lines 15-25, teaches more spatial resolution needed to render non-continuous tone regions than to render continuous tone regions), wherein the image data process is performed by a high quality scanner to implicitly obtain a high quality image (specification, page 2, lines 5-8).

And Hyatt teaches removing/discarding pixels 972, 983, ... along a horizontal direction parallel to the edge while selecting/remaining pixels along the vertical direction

perpendicular to the edge (see Fig. 9J, and col. 206, lines 4-9 and lines 21-34), wherein the Hyatt's device is to improve the edges smoothing (col. 11, lines 32-33) so as to implicitly render high quality images.

Therefore, it would have been obvious for Honma to use extra resolution in a direction perpendicular to an edge of marks to provide the high resolution data containing non-continuous tone data as taught by PAA and to discard pixels along a direction parallel to an edge and maintain those along a direction perpendicular to the edge as taught by Hyatt in order to reproduce high quality images.

Regarding claims 16 and 17, Honma discloses the image forming device is an ink jet printer (col. 6, lines 50-51).

5. Claims 13, 14, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shannon et al. (U.S. Patent No. 6,026,196) in view of Hyatt (U.S. Patent No. 5,487,172).

Regarding claim 13, Shannon discloses:

- decompressing a single byte of compressed data to produce 4 pixels of non-continuous tone data (col. 10, lines 43-46, teaches decompressing the Sync byte (i.e., the single byte) by extracting the four pixels 0 to 3 therefrom, and these 4 pixels belong to a line of dithered image data (i.e., the line art or the non-continuous tone data).

One skilled in the art would have clearly recognized that the method of Shannon is capable of converting a multi-bit per pixel image into a single bit per image (col. 3, lines 29-31), so as to implicitly reduce processing bandwidth. Shannon does not

specifically teach discarding pixels along a direction parallel to an edge while maintaining pixels along a direction perpendicular to the edge.

Hyatt teaches removing/discarding pixels 972, 983, ... along a horizontal direction parallel to the edge while selecting/remaining pixels along the vertical direction perpendicular to the edge (see Fig. 9J, and col. 206, lines 4-9 and lines 21-34), wherein the Hyatt's device is to reduce processing bandwidth (see Abstract).

Therefore, it would have been obvious for Shannon to discard pixels along a direction parallel to an edge and maintain those along a direction perpendicular to the edge as taught by Hyatt in order to reduce the processing bandwidth.

Regarding claim 14, Shannon teaches:

- transmitting the byte of data to a print engine (col. 9, lines 26-28);

- extracting data necessary to render two non-continuous tone data pixels and fabricating two more non-continuous tone data pixels in a low spatial resolution direction based on a set of values of the extracted data (col. 10, lines 43-46).

Regarding claim 18, although Shannon and Hyatt do not specifically teach that the four pixels represent a two-by-two pixel array, such a limitation is merely a matter of design choice and would have been obvious in the method of Shannon and Hyatt. Shannon teaches a single byte of compressed data to produce 4 pixels of non-continuous tone data (col. 10, lines 43-46). The limitation in claim 18 does not define a patentably distinct invention over that in Shannon since both the invention as a whole and Shannon and Hyatt are directed to produce pixel data. The format in which the data is produced is inconsequential for the invention as a whole and presents no new or

unexpected results, so long as the data is successfully produced. Therefore, to have the pixel data to present a two-by-two pixel array would have been obvious design choice to one of ordinary skill in the art.

Allowable Subject Matter

6. Claims 7 and 10-12 are allowed.

7. The following is a statement of reasons for the indication of allowable subject matter:

Regarding to independent claim 7, the present invention provides a new method for compression and decompression that at least double the spatial resolution for non-continuous tone data, while maintaining adequate spatial resolution for continuous tone data and minimizing the amount of memory and corresponding transmission bandwidth requirements (specification, page 3, lines 4-8). Particularly, the new method comprising the following features, which the prior art, taken either singly or in combination, does not teach:

- referencing a segmentation bit of the bitword to determine whether the bitword contains non-continuous tone data;

- referencing a direction bit to determine whether the direction of the edge located in spaced relationship to the first and second pixels;

- referencing the three bit value indicative of a first pixel;

- referencing the three-bit value indicative of the second pixel.

Regarding independent claims 10-12, the present invention provides a new method for compression and decompression, in which the high spatial resolution non-continuous tone data is compressed by quantizing and packing high resolution pixels in a direction across the edge, i.e., perpendicular to an edge of mark to be rendered, and discarding high resolution pixels along the edge, i.e., parallel to edge; additional information, called tag bits, indicating the directions of edge, i.e., vertical or horizontal directions, and the type of image data, i.e., continuous or non-continuous tone data, is also stored to enable decompression (specification, page 4, lines 4-10). Particularly, the new method comprising the following features, which the prior art, taken either singly or in combination, does not teach:

- synthesizing the data comprising rendering from each bitword twice as many pixels in a direction perpendicular to an edge indicated by the direction bit of that bitword;

- using the three bit value associated with the first pixel and the three bit value associated with the second pixel in the compressed data bitword to determine slope in the slow/fast scan direction to render the horizontal/vertical edge.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANH H DO whose telephone number is 703-308-6720. The examiner can normally be reached on 5/4-9.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID K MOORE can be reached on 703-308-7452. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-308-5397 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

September 22, 2003

ANH HONG DO
PATENT EXAMINER